**Update to JHT Progress Report on the H*Wind Project, 3-29-2002**

NHC/TPC Hurricane specialists completed 10 retrospective analyses in early March and provided a prioritized list of requested enhancements based on their experience. HRD scientists and CIMAS software engineers have examined the list and, given the level of anticipated funding, we can realistically allocate resources and set time lines for these tasks as described below. It is important to note that nearly all the requested high priority items can be implemented within the time frame for completing the transition to operations during the 2003 hurricane season. NHC request items are in plain text and the respective HRD response and time estimate is below each item in italics.

**Priority: Very High (required for operational system)**

Include GPS sonde WL150 wind (reduced) in the database.

*We will implement a new platform for the observation window in the QC client, possibly called GPSSONDE_WL150 Based on James Franklin's message on 3/18/2002, this is the reduction algorithm:*

```
> For the dropsonde data, here is the equation to reduce
> the WL150 wind to the surface:
>
> WSsfc = WL150*RF, where
> RF = 1.0314 - 0.004071*z + 2.465E-5*z**2 - 5.446E-8*z**3.
>
> z is the height (m) of the midpoint of the 150 m layer over
which
> WL150 is computed. This height appears in the TEMP-DROP comment
> section immediately after the WL150 wind. We only do this
reduction
> if z<=200 m.
```

Timeline: 7/1/2002

Include user-defined reduction factors, based on altitude of observation and radius from center. H*wind would ask for a cutoff radius that would define the regions used for "eyewall" and "outer" reduction factors. Fixed reduction factors would be used within each region for a given flight altitude. Program would display these factors, in case the user wanted to modify them.

```
James Franklin sent this message on 3/18/2002:

> My analysis of the dropsonde data yields the following flight-
level
> reductions reductions:
>
> Level Eyewall Outer
> ---------------------------
> 700 mb 0.90 0.85
> 850 mb 0.80 0.80
> 925 mb 0.75 0.75
> 1000 ft 0.80 0.80
```

```
>
> Note that only at 700 mb does it appear to matter whether you
are in the
> eyewall or not. I suggest that the user provide an estimate of
the
> "eyewall" radius, and that 0.90 be used within this domain.
Outside of
> this radius, the lower figure would be used, perhaps with a
small buffer
> zone (few km wide?) where the the reduction factor would
smoothly drop
> from 0.90 to 0.85.
>
> It would probably be a good idea to present this table of
reduction
> factors to the user and offer the opportunity to override them
(for
> less convective storms, for example, or those over colder
water).
>
> For flight levels in between those given here, you could either
> interpolate (preferable) or define layers over which the above
factors
> would apply. The reduction factor labeled 1000 ft should
probably be
> used for all "low-level" flights, regardless of specific
altitude.
```

*The Adjustment factors supplied by James Franklin will be implemented because they are based on documented research. When deciding which reduction of flight-level winds to use, the user will be able to decide among the HRD PBL model, the "JF" reduction, and the HRD empirical reduction. All methods are documented and traceable. The user should NOT be permitted to override the JF adjustment factors. An overriding reduction factor should not be implemented without substantive documentation on the basis for the method and the conditions under which it is applicable.*

*The Use Case for this feature is as follows:*

> *QCClient will show Rmax of flight-level data (Air Force and NOAA) for all observations with pressure > 650mb and located within 5 degrees of storm center. User can edit this radius, cancel operation or accept it. Do not allow adjustment if there is NO flight-level data selected.*
>
> *When radius is accepted, multiply flight-level wind speed of observations by the factor of the table. The actual pressure range will work as follows:*
>
> *650-799, use 700mb*
> *800-899, use 850mb*
> *900-937, use 925mb*
> *938-975, use 1000ft*

*The 'Eyewall' factor will be applied to observations located between 0.8 and 1.2Rmax. The 'Outer' factor will be applied to the rest of observations. There will not be any smoothing done. There will not be a capability to override these factors. Thus, this set of reductions will be called "JF reduction". All observations affected will become edited observations and they will receive a comment such as "JF reduction - 0.?? Eyewall" or "JF reduction - 0.?? Outer"*

Timeline: 8/1/2002

Automatic annotations, including storm name, date/time interval, storm motion, central pressure, data sources, radii and max winds.

Timeline: 6/1/2002 (Russell) Beta version 5/1/2002

Automated storm track updates. Timeline: 6/1/2002 or before

Automated generation of time window, storm track, and data retrieval. For example, if you initiate the program at 1330Z, the time window would automatically be set to be a six hour period ending at 1330Z (perhaps round the times to the nearest half hour?). The nominal time of the analysis would also be at 1330Z. Or, if the nominal time cannot be the same as the end time, then have the analysis interval be from 0800-1400, with a nominal time of 1330 Z. H*wind would automatically extrapolate an end time position and a nominal position using the storm speed taken from the ATCF compute file. Program would then automatically load all observations during the time window. Also automatically load background field from the previous analysis. If the automated process didn't work well, the user could go back and manually adjust the track using existing tools.

*The Use Case for this feature would be as follows:*

*Since there could be several events going on, this automation can happen only after user has picked one event, the best place being the "Current Events" panel.*

*At that time, figure out the time to the next nearest half hour and extrapolate a fix given this time and storm speed and direction from a previous ATCF or VORTEX fix. This last fix will be set to both the track's ending and center fix.*

*Set track's beginning fix 6 hours prior to ending time, or as far as possible if less than 6 hours available.*

*Load observations for this time window.*

*Load background field, the most recent one in the last 9 hours (if there exists one). Somehow, show original time of background field and strongest observed wind.*

*The time of the analysis corresponds to the track's center time.*

*Spawn the task of checking for new data and fixes at 10-minute frequency.*

*Repeat steps 'b' through 'e' every half hour, where the time window would move accordingly while keeping a 6 hour-range.*

Timeline: 8/1/2002

Output results (radii, max wind) to ATCF fix format message. Is the final official format decided? We haven't gotten final word.

Timeline: cannot say

Output display to N-AWIPS, or perhaps automated retrieval of graphical output to an intranet page. We prefer not developing output to N-AWIPS. NHC has experts on N-AWIPS and Gempack who could more efficiently grab H*Wind gridded files and process them as they see fit. Second option is already on the horizon. After Russell gets automatic annotation done, the next thing is to display the analysis output on a web page and direct the user to it. In order to keep good quality of image, postscript will be converted to PNG (accepted by latest browsers) or PDF (Acrobat Reader).

Timeline: 7/1/2002 (Russell)

Need an 'undo' edit command that reverts back to the flagging state before the last edit. An Undo menu command would be too much work and memory intensive. There are already tools for group and individual unflagging, plus the other ones proposed in items 9 and 11.

Timeline: not applicable

One-click data flagging. Reduce the number of clicks needed to flag an observation. Currently it takes 4 mouse clicks, but it really only needs to require 1, if the reason for flagging is not going to be entered (which it won't be operationally). We will remove the window asking for a reason for flagging. A new tool, called 'Individual Flagging' will be developed, in which a valid observation is flagged just by clicking on it on the map. Intuitively, if the user clicks on an already flagged observation (which shows in gray), it would set it back to valid status. Choosing this tool will open automatically the Inspector for immediate feedback on the observation being edited.

Timeline: 10/1/2002

The method of selecting a time window for data retrieval is unwieldy. When selecting the time window for data retrieval, the default time window should be the time period defined by the beginning and end times of the storm track.

Timeline: 7/1/2002

**Priority: High (required for operational system)**

Need the ability to flag only a single type of data when using the group edit command. There is no "group edit" in QCClient so this must refer to the "group flagging" command. Suggestion: Keep our current group flagging mode but rename it to "Flag All". Create a new tool, "Flag by Platform", in which a window pops up with all platforms detected on the chosen area. The user then can then select which platforms should actually be flagged within that region.

Timeline: 10/1/2002

Restricted data retrieval to environment (1000 km?) of selected storm. This request is very much tied to new database changes. We have already discussed the necessary changes. Nirva is working actively on this.

Timeline: 4/2003

Scan for and include analysis maximum wind on the graphical output with the radii information.

*To implement this we will supply u,v,x,y of the observed maximum wind on 1st line of krdfile. Database-> Create new fields for observed_max_wind_u, observed_max_wind_v, observed_max_wind_y, observed_max_wind_x, and the same idea for mesoscale max wind and merged max wind. Nirva will create new table with analysis_id and components. IDL code will be added to display an arrow indicating the location and direction of the observed max wind*

Timeline: 5/1/2002

*We will also include the observed maximum wind speed value in the annotation portion of the analysis graphic.*

Timeline: 6/1/2002 (Russell)

A default set of data types that are already checked off.

These data types will be selected for display by default: Air Force, NOAA, Ships, Buoys, CMAN, Qscat, GOES surface, GPS mbl, SFMR

Timeline: 7/1/2002

It is awkward to see how the mesh boundaries lay out against the data, because you can't see them while you have access to manipulating the map. Can the mesh boundaries be selected earlier in the process, and remain on the map while editing is occurring?

*We will separate the mesh-size decision from Analysis wizard dialog. By default, when user loads a track, we will subtly draw the location of the 5 default meshes. A tool will be designed to change the mesh sizes either by leaving the default or*

*following the sequence of steps required for an expert:*

- *enter size of innermost mesh*
- *enter number of meshes of size of outermost mesh*
- *present editable table to change parameters.*

*There will also be a way to turn off the mesh display on the map, in case they bother the user. Analysis will not be allowed until meshes have been chosen.*

Timeline: 4/2003

On a monitor, the observations are hard to see against the white background of the map. Have you tried using a black background? We may also want to change the default colors for the most important data types (recon, in particular, is hard to see against white background). (For printing, though, white background is obviously better.)

*With improved zooming capabilities recently implemented (see #21), the white map background should not be a problem. Colors may easily be changed by the user to whatever they want. When compared to our other requests and additional work we are doing to improve the application and transition it to operations, we will only be able to apply default colors at the expense of one of the other requested items.*

Timeline: remote

Ability to turn off the Soukup postprocessing step.

*Postprocessing means the enhancement algorithm designed by Dr. Soukup. An option will be passed in the 1st line of the krdfile to let IDL know whether to do it or not. This option will be offered in the Analysis wizard dialog.*

Timeline: 8/1/2002

Need a glossary of H*wind terms. For example, what is a 'shapefile'?

*We are implementing a tutorial that will include these terms and additional documentation.*

Timeline: 7/1/2002

Many of the command or window labels are non-intuitive and make for a steep learning curve. Some label changes would help:

Label 'OCEANIC' is not a very descriptive way to describe the reduction algorithm in data type names. There will be many possible ways of doing the reduction, using the Powell boundary layer model is one way. Perhaps this could be changed to 'MDP_PBLMODEL', or something like this. Then one could come

up with an equally descriptive label for the fixed ratio reduction factors that we want.

*The 'OCEANIC' label found in the "Load Observations" dialog is not meant to distinguish reduction algorithms, but rather to distinguish exposures. We use this window to load data over land or over the ocean, or both. The 'OCEANIC' suffix in data sources of the observation window could benefit from more intuitive naming. We welcome suggestions for a preferred observation naming convention.*

Timeline: 10/1/2002

As a source description for fixes, 'ATCF' seems inappropriate, as the ATCF has all kinds of fix information. If this is meant to come from our compute (model initialization) data, then 'CARQ' would be more meaningful to us.

*We will rename ATCF_FIXES to CARQ_FIXES.*

Timeline: 6/1/2002

"Select Storm Size" to "Select Analysis Parameters". This one is especially confusing because the user doesn't know how to base his decision. For example, what is a 'poorly-defined' storm? It appears to have the same analysis parameters as a large storm, but in fact it doesn't. Also, how large is large? More help here is needed to better guide the user to make the right decision.

*The descriptions of the analysis parameter be included in the tutorial. This information is already posted in http://cat5.nhc.noaa.gov under H*WIND instructions. This will become a non-issue once we complete the 5-mesh default analysis.*

Timeline: Done for current version. We project the next version (5-mesh) will be available by 5/1/2002.

In "Load wind observations" dialog box, change header to "Surface or Upper-air Analysis".

*It will be changed to "Surface or Upper-level"*

Timeline: 7/1/2002

When selecting the beginning, center, or end times of the flight track, and a logical mistake is made, the error message is too cryptic to be of much help. Maybe some instruction on the correct sequence would be nice.

*We will incorporate the actual time values in the explanation; that should make more sense.*

Timeline: 8/1/2002

In storm track dialog, change "Load" to "Add to track". (I.e., reserve 'load' to mean the bringing in of something, not the exporting of something.)

*All the "Load" labels will be reviewed. Our intention was already to use 'load' when bringing something in.*

Timeline: 7/1/2002

The group flag icon (the big X) is real clunky, and having the upper-left corner of the x as the 'business end' is counter-intuitive. Icon should be smaller and the center should be the active spot.

*The intuitive way is exactly the way it was coded. When H*WIND is run on a Windows PC, Macintosh OS X, Sun Solaris or Mandrake Linux, a small X is shown whose center is the active spot. It looks like something to do with the Windows Manager on HP or the screen resolution. Don't know how to solve it; it seems like something that could steal lots of valuable time.*

Can't zoom in enough to see all the aircraft obs adequately.

*The new area limit for zooming will be 0.1x0.1 degrees, as opposed to 1x1 degree as before. It will be available by 5/1/2002.*

**Priority: Low (desirable, but not an operational requirement)**

There is an awkwardness about choosing the method for reducing aircraft winds. To use the Powell model, one simply selects a data type, but to use the new GPS-sonde-based reduction method, you first have to select a different data type and then operate on it. Now we are going to be adding another methodology (user-defined reductions). It would easier on the user if the various reduction methodologies were handled using the same mechanics, i.e., either define separate data types for each kind of reduction, or just have one data type (AIRCRAFT) and then operate on it using one of the three methodologies.

*This is tied to the enhancements we will provide on the observation panel to reduce confusion when dealing with platforms' surface and raw data. However, new methods to adjust flight level data require that the user monitor and perhaps change the radius of maximum wind so this cannot be implemented automatically.*

Timeline: 10/1/2002

Capability to de-alias scatterometer data.

*This item is supported by a NESDIS project. We will start this summer with the help of a student intern. We have already decided how to handle it in database.*

Timeline: 10/1/2002

Once you click on an observation to edit, there is no visual clue in the map as to which ob you are editing. Could the ob being edited be highlighted in some way? (Note: this becomes less of an issue if we have 'one-click' flagging.)

Timeline: 8/1/2002

Display quadrant radii in order consistent with NHC advisories.

*We should be able to incorporate this change in the next version of IDL scripts, due along with the 5-mesh business. Therefore, 6/1/2002 sounds reasonable.*

Provide a progress bar or other indicator when loading from the database (or some feedback that the process is functioning normally).

Timeline: 4/2003

Having additional editing tools, like a circle, would be nice for selecting areas centered on the storm center or other features. What would be best is a freehand tool.

*We believe that the changes planned for the flagging tool will be sufficient. A freehand tool would be difficult to implement.*

Timeline: remote

**Miscellaneous questions and comments:**

3. Can't consistently save results (QC set) of an analysis.

*A database problem was discovered. This has been resolved for future storage and retrieval. We have been able to store several QCsets. Sonia needs more details or to be present during future testing to be able to reproduce problems.*

Timeline: 7/1/2002

4. Can't save interpolated fixes.

*For analysis, we will accept interpolation as a beginning fix, but for storage, we will also include the previous non-interpolated fix (i.e. the fix that the interpolation was based on).*

Timeline: 10/1/2002

*We will also draw observations in storm relative mode as soon as there is a track.*

Timeline: 7/1/2002